

**AMENDMENT TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. Canceled.
2. Canceled.
3. (Currently Amended) The ~~receiver~~ system of Claim + 23 wherein the threshold circuit apparatus further comprises:
  - (f) a second logic apparatus which calculates an overflow threshold (T2) for the storage apparatus using queuing analysis ~~likewise~~ having regard to the inequalities
$$T1 > Q_{max}/8 \quad \text{Eq (a)}$$
$$T2 < 15 * Q_{max}/16 \quad \text{Eq (b)}$$
$$T1 \leq T2 - Q_{max}/16 \quad \text{Eq(c).}$$
4. (Currently Amended) The ~~receiver~~ system of Claim + 23 wherein the ~~updated transmit fraction~~ threshold apparatus further comprises:
  - (g) a first logic apparatus which calculates a first ~~selected~~ transmit ~~fraction~~ update where the storing apparatus contains a quantity of the data packets between thresholds T1 and T2.
5. (Currently Amended) The ~~receiver~~ system of Claim + 23 wherein the ~~updated transmit fraction~~ threshold apparatus further comprises:
  - (h) a second logic apparatus which calculates a second ~~selected credit~~ transmit update ~~value~~ where the storing apparatus contains a quantity of the data packets ~~between thresholds less than~~ T1.

6. (Currently Amended) The ~~receiver~~ system of Claim 1 23 wherein the updated transmit fraction apparatus further comprises:

(i) a third logic apparatus which calculates a third ~~selected-credit~~ transmit update ~~value~~ where the storing apparatus contains a quantity of the data packets ~~between thresholds~~ is greater than T2.

7. (Currently Amended) The ~~receiver~~ system of Claim 1 23 further comprising:

(j) second processing apparatus to which the updated transmit rate ~~fraction~~ is communicated.

8. (Currently Amended) The ~~receiver~~ system of Claim 1 23 further comprising:

(k) communication apparatus which transmits ~~an~~ the updated transmit rate to a the sender.

9. (Currently Amended) The ~~receiver~~ system of Claim 1 23 further comprising:

(l) threshold setting apparatus which at initialization selects the values of ~~the~~ thresholds set in the storage apparatus.

10. (Currently Amended) The ~~receiver~~ system of Claim 1 23 further comprising:

(m) connecting apparatus which connects the register apparatus in ~~the~~ a receiver to ~~the~~ an ~~update~~ updated transmit rate register in the sender.

11. (Currently Amended) A communication system for preventing overflow and underflow in a receiver, comprising:

- (a) a sender sending data at a selected transmit rate (Tr) to the receiver;
- (b) storage apparatus with occupancy (Q) in the receiver for storing the data;
- (c) transmit rate generating apparatus, which generates a transmit rate (Tr) as a feedback signal to the sender in a regular time interval (Dt) for controlling Tr;
- (d) threshold apparatus which establishes threshold T1 in ~~Q~~ the storage apparatus indicative of the least storage in ~~Q~~ the storage apparatus to prevent underflow and

threshold T2 indicative of a maximum storage in ~~Q~~ the storage apparatus to prevent overflow and ~~(e) queue monitoring apparatus which determines~~ determining the level of data storage Q in the ~~queue storage apparatus~~ at regular time intervals; and

~~e)(f)~~ computing apparatus which compares Q to T1 or T2 and communicates to the sender a transmit rate (Tr), every Dt time units where  $Tr = 0$  when  $T2 \leq Q \leq Q_{max}$ ;  $Tr = Max/2$  when  $T1 \leq Q < T2$  and  $Tr = Max$  when  $0 \leq Q < T1$  where Qmax is maximum storage capacity of data in the receiver and Max is the a maximum sending rate possible from the sender.

12. (Currently Amended) The system of Claim 11 further comprising:

~~(f)(g)~~ initialization algorithm which chooses Dt to be greater than the sum of transmission signal and receiver processing delays.

13. (Currently Amended) The system of Claim 11 further comprising:

~~(g)(h)~~ initialization algorithm which chooses Dt to be less than the value  $Q_{max}/(Max * 8)$  ~~where Qmax is maximum storage capacity of data in the receiver and Max is the maximum sending rate possible from the sender.~~

14. (Currently Amended) The system of Claim 11 further comprising

~~(h)(i)~~ communication apparatus for transmitting the transmit rate from the receiver unit to the sender as a feedback signal controlling the transmit rate.

15. (Currently Amended) In a communication system, a method for preventing overflow and underflow in a receiver comprising the steps of:

(a) transmitting data at a selected transmit rate Tr from ~~the~~ a sender to the receiver;

(b) temporarily storing data awaiting processing in a storage apparatus Q with occupancy;

(c) generating a transmit rate (Tr) as a feedback signal to the sender in a regular time interval (Dt) for controlling Tr;

(d) establishing a threshold  $T1$  in the  $Q$  storage apparatus indicative of the least storage in the  $Q$  storage apparatus to prevent underflow;

(e)(f) establishing a threshold  $T2$  in the  $Q$  storage apparatus indicative of the maximum storage in the  $Q$  to prevent overflow;

(f)(g) determining the level of ~~data storage~~- $Q$  in the ~~queue~~ storage apparatus at regular intervals of duration  $Dt$ ; and computing and communicating a transmit rate  $Tr$  every  $Dt$  time units where  $Tr = 0$  when  $T2 \leq Q \leq Q_{max}$ ;  $Tr = Max/2$  when  $T1 \leq Q < T2$  and  $Tr = Max$  when  $0 \leq Q < T1$  where  $Q_{max}$  is maximum storage capacity of data in the receiver and  $Max$  is the a maximum sending rate possible from the sender.

16. (Currently Amended) The method of Claim 15 further comprising the step of:

(g)(h) choosing  $Dt$  to be greater than the sum of transmission signal and receiver processing delays.

17. (Currently Amended) The method of Claim 15 further comprising the step of:

(h)(i) limiting the value of  $Dt$  to be less than the value  $Q_{max}/(Max*8)$  where  $Q_{max}$  is maximum storage capacity of data in the receiver and  $Max$  is ~~the~~ a maximum sending rate possible from the sender.

18. (Currently Amended) The method of Claim 15 further comprising the step of:

(i)(j) communicating the transmit rate from the receiver unit to the sender as a feedback signal controlling the transmit rate.

19. (Currently Amended) A medium, executed in a computer system, for preventing overflow and underflow in a receiver comprising:

(a) program instruction transmitting data from a sender to a the receiver at a transmit rate ( $Tr$ ) refreshed with regular period ( $Dt$ );

(b) program instruction storing the data in a storage apparatus with occupancy  $Q$  in the receiver;

- (c) program instruction generating a transmit rate ( $Tr$ ) as a feedback signal to the sender in a regular interval ( $Dt$ ) for controlling the transmit rate  $Tr$ ;
- (d) program instruction establishing a threshold  $T1$  in the Q-storage apparatus indicative of the least storage in the  $Q$  to prevent underflow;
- (e) program instruction establishing a threshold  $T2$  in the Q-storage apparatus indicative of the maximum storage in the  $Q$  to prevent overflow;
- (f) program instruction determining the level of data storage in the queue storage apparatus at credit intervals; and
- (g) program instruction computing and transmitting a transmit rate every  $Dt$  time units where  $Tr = 0$  when  $T2 \leq Q \leq Q_{max}$ ;  $Tr = Max/2$  when  $T1 \leq Q < T2$  and  $Tr = Max$  when  $0 \leq Q < T1$  where  $Q_{max}$  is maximum storage capacity of data in the receiver and  $Max$  is the a maximum sending rate possible from the sender.

20. (Currently Amended) The medium of Claim 19 further comprising the step of:  
~~(h)(g)~~ program instruction choosing at initialization the value  $Dt$  to be greater than the sum of transmission signal and receiver processing delays.

21. (Currently Amended) The medium of Claim 19 further comprising the step of:  
~~(i)(h)~~ program instruction choosing at initialization the value  $Dt$  to be less than the value  $Q_{max}/(Max*8)$  ~~where  $Q_{max}$  is maximum storage capacity of data in the receiver and  $Max$  is the maximum sending rate possible from the sender.~~

22. (Currently Amended) The medium of Claim 19 further comprising the step of:  
~~(j)(i)~~ program instruction communicating the transmit rate from the receiver unit to the sender as a feedback signal controlling the transmit rate.

Please add the following NEW Claim:

23. (NEW) A credit-based system for determining a transmit rate from a sender guaranteeing the prevention of underflow and overflow conditions, comprising:  
 (a) receiver processing apparatus which receives data packets;

(b) storing apparatus, which receives and stores the data packets from the ~~receiver~~ processing apparatus;

(c) threshold apparatus for updating transmit rate with fixed period coupled to a register apparatus for receiving the updated transmit rate; and

(d) apparatus for communicating the updated transmit rate to a sender, wherein the threshold circuit apparatus calculates an underflow threshold (T1) for the storage apparatus using queuing analysis, having regard to inequalities

$$T1 > Q_{\max}/8 \qquad \text{Eq (a)}$$

$$T2 < 15 * Q_{\max}/16 \qquad \text{Eq (b)}$$

$$T1 \leq T2 - Q_{\max}/16 \qquad \text{Eq (c).}$$